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Cover Memo

Date: 08/18/95

To: Harry M. Walker
H.M. Walker & Associates
3321 E. Bayou Dr.
Dickinson, TX 77539

From: Lila Waring  TMG/Platzer Shipyard

Subject: Proposed Safety Guidelines for Vapor Control during Degassing

Enclosed is the draft of the proposed safety guidelines for vapor control during degassing, 46 CFR Part 39.5 and Part 154 Amended, per your request.

If you need additional information, please let me know.

LW/

*Pages 2-13
omitted ..*




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Date: June 23, 1995

To: All Members of the Chemical Transportation Advisory Committee

cc: Captain Kevin Eldridge, United States Coast Guard

From: Neal Platzer - CTAC Chairman 

Re: Proposed Safety Guidelines for Vapor Control during Barge Cleaning

Attached is the work product prepared by the Subcommittee on Vapor Control during Barge Cleaning. This work product was presented at the last CTAC meeting by the Subcommittee. The proposal from the Subcommittee is that this be substantially adopted by the Coast Guard as minimum safety standards governing facilities, barges, and operations during vessel degassing where required by state and federal law or where voluntarily done for other reasons.

The Subcommittee further proposed that these guidelines be published as soon as possible as a Navigation and Vessel Inspection Circular (NVIC) and that subsequently the Coast Guard develop and promulgate regulations by November 1997 (one year after the Texas requirement for implementation of vapor control during barge cleaning). A NVIC contains information on a particular issue for use by industry and Coast Guard field units. Although compliance by industry is voluntary, a NVIC is frequently utilized as a precursor to regulations, which require mandatory compliance. When signed, it is distributed to major industries along with a cover page which provides the purpose and background of the NVIC.

In addition there are some minimum requirements for loading and unloading terminals in this proposal that would require terminals to have the ability to strip cargo out of the drip pans, etc. before releasing the barge.

Please review these and give me your vote on approval, and if disapproval, give me the basis (for ex. what section or part you disapprove of and why). I request your response in writing to my office no later than 60 days from today.

NSP/lw

Enclosure

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154.908 Vapor control system, general

- a) A vapor control system design and installation must eliminate potential overpressure and vacuum hazards, and sources of ignition to the maximum practical extent. Each remaining hazard source which is not eliminated must be specifically addressed in the protection system design and operational requirements.
- b) Vapor collection system piping and fittings must be in accordance with ANSI B31.3 and designed for a maximum allowable working pressure of at least 150 psig. Valves and flanges must be in accordance with ANSI B16.5 or B16.24, 150 class.
- c) All electrical equipment used in a vapor control system must comply with NFPA 70.
- d) Any pressure, flow, or concentration indication required by this part must provide ~~indication~~ indicator at the cleaning facility where the vapor control system is controlled.
- e) Any alarm condition specified in this part must activate an audible and visible alarm at the cleaning facility where the vapor control system is controlled.
- f) The vapor control system must be separated or insulated from external heat sources to limit vapor control system piping surface temperature to not more than 70 percent of the auto-ignition temperature in degrees Celsius of the vapors being degassed during normal operation.
- g) A means must be provided to eliminate any liquids from the vapor collection system.
- h) A liquid knockout vessel must be installed between the facility vapor connection and any vapor moving device in systems that have the ~~gas/vapor connection to the vapor mover~~ from the vessel. The liquid knockout vessel must have:

7.32

 - 1. A means to indicate the level of liquid in the device;
 - 2. A high liquid level sensor that activates an alarm; and
 - 3. A high high liquid level sensor that closes the remotely operated cargo vapor shutoff valve required by 154.910(a) of this subpart and shuts down any vapor mover prior to liquid carrying over from the vessel to the vapor mover. The high high liquid level sensor must be independent of the high liquid level sensor required by (h) (2) of this subsection.
- i) Vapor collection piping must be electrically grounded and electrically continuous.
- j) If the facility handles inerted vapors of cargoes containing sulfur, provisions must be made to control heating from pyrophoric iron sulfide deposits in the vapor collection line.
- k) Each cleaning facility that utilizes a vapor collection system must maintain a list of chemicals for which the system is approved. This list must be made part of the facilities

154.910 Vapor line connections

- a) A ~~remotely~~ operated cargo vapor shutoff valve must be ~~installed in the vapor line between the facility vapor connection and the first liquid knockout vessel.~~ The valve must:
1. Close within thirty (30) seconds after detection of a shutdown condition by a component required by this subpart;
 2. Close automatically if the control signal is lost;
 3. Activate an alarm when a signal to shut down is received;
 4. Be capable of manual operation or manual activation;
 5. Have a local valve position indicator or be designed so that the valve position can be readily determined from the valve handle or valve stem position; and
 6. If the valve seat is fitted with resilient material, not allow appreciable leakage when the resilient material is damaged or destroyed.
- b) A fluid displacement system must install a remotely operated shutoff valve in the fluid injection supply line between the point where the inert gas or other medium is generated and the fluid injection connection. The valve must:
1. Close within thirty (30) seconds after detection of a shutdown condition by a component required by this subpart;
 2. Close automatically if the control signal is lost;
 3. Activate an alarm when a signal to shut down is received;
 4. Be capable of manual operation or manual activation;
 5. Have a local valve position indicator or be designed so that the valve position can be readily determined from the valve handle or valve stem position; and
 6. If the valve seat is fitted with resilient material, not allow appreciable leakage when the resilient material is damaged or destroyed.
- c) Each hose used for transferring vapors must:
1. Have a design burst pressure of ~~at least 5 psig~~;
 2. Have a maximum allowable working pressure of at least 5 psig;
 3. Be capable of withstanding at least the maximum vacuum rating of the vapor moving device without collapsing or constricting if used where subject to vacuum;
 4. Be electrically continuous with a maximum resistance of ten thousand (10,000) ohms;
 5. Have flanges with a bolt hole arrangement complying with the requirements for 150 class ANSI B16.5 flanges; and
 6. Be abrasion resistant and resistant to kinking.
- d) Vapor hose handling equipment must be provided with hose saddles which provide adequate support to prevent kinking or collapse of hoses.
- e) Fixed vapor collection arms must meet the requirements of paragraphs (c)(1) through (c)(5) of this section.

154.914 Facility requirements for vessel vapor overpressure and vacuum protection

- a. A facility's vapor collection system must have the capacity for collecting cleaning facility vapors at a rate of not less than 1.1 times the facility's maximum allowable degassing rate plus any inerting, diluting, or enriching gas which may be added to the system.
- b. A facility vapor collection system must maintain the pressure in a vessel's cargo tanks between 80 percent of the highest setting of any of the vessel's vacuum relief valves and 80 percent of the lowest setting of any of the vessel's pressure relief valves. The system must be capable of maintaining the pressure in the vessel's cargo tanks within this range at any degassing rate less than or equal to the maximum degassing rate determined at the pre-cleaning conference required by 156.120(w) of this chapter.
- c. A fluid displacement system must provide a pressure sensing device which activates an alarm when the pressure at the facility gas injection connection exceeds either the pressure corresponding to the upper pressure determined in paragraph (b) of the section or a lower pressure agreed upon at the pre-cleaning conference required by 156.120(w) of this chapter. The pressure sensing device must be located in the fluid displacement systems fixed piping down stream of any devices that could potentially isolate the barge from the pressure sensing device. The pressure measured by the sensing device must be corrected for pressure drops across any vessel piping, hoses or arms used to inject the fluid.
- d. A fluid displacement system must provide a pressure sensing device, independent of the device required by paragraph (c) of this section, which activates the fluid displacement system emergency shutdown system and closes the remotely operated valve required by paragraph 154.910 (a) of this subpart and the remotely operated valve required by paragraph 154.910 (b) of this subpart when the pressure at the fluid injection connection reaches 90% of the highest setting of any pressure relief valve on the vessel. The pressure sensing device must be located in the fluid displacement systems fixed piping down stream of any device that could potentially isolate the barge from the pressure sensing device. The pressure measured by the sensing device must be corrected for pressure drops across any vessel piping, hoses or arms used to inject the fluid.
- e. If a compressor, blower, eductor, or other vapor mover capable of drawing more than 0.5 psig vacuum is used to draw vapor, air, inert gas or other medium from the vessel, a vacuum relief valve must be installed on the facility fixed vapor collection piping between the vapor mover and the facility vapor connection. The vacuum relief valve must meet the following requirements:
 - 1) Relieves at a pressure not to exceed 0.5 psig vacuum;
 - 2) Has a relieving capacity equal to or greater than the capacity of the maximum capacity of the vapor moving device;
 - 3) Has a flame screen or flame arrester fitted at the relief opening;

- 4) Has been tested for relieving capacity in accordance with paragraph 1.5.1.3 of API 2000 with a flame screen or flame arrester fitted; and
- 5) Has materials of construction compatible with the vapors being degassed.

154.920 Fire, explosion, and detonation protection

- a) A vapor control system with a single facility vapor connection that processes vapor other than high flash point cargoes with a vapor recovery unit must:
 - 1. Have a ~~detonation arrester~~ located between the first liquid knockout vessel and the vapor moving device, or within 6 meters of the first liquid knockout vessel outlet if no vapor moving device is installed, or within 6 meters of the facility vapor connection if no liquid knockout vessel is installed; or
 - 2. Have an inerting, enriching, or diluting system that meets the requirements of 154.924 of this subpart.
- b) A vapor control system with a single facility vapor connection that processes vapor other than high flash point cargoes with a vapor destruction unit must:
 - 1. Have a detonation arrester located between the first liquid knockout vessel and the vapor moving device, or within 6 meters of the first liquid knockout vessel outlet if no vapor moving device is included, or within 6 meters of the facility vapor connection if no liquid knockout vessel is required; and
 - 2. Have an inerting, enriching, or diluting system that meets the requirements of 154.924 of this subpart.
- c) A vapor control system with multiple facility vapor connections that processes vapor other than high flash point cargoes with a vapor recovery unit must have a detonation arrester located between the first liquid knockout vessel, or the facility vapor connection if no liquid knockout vessel is required, and the multiple facility vapor collection system connection.

- d) A vapor control system with multiple facility vapor connections that processes vapor other than high flash point cargoes with a vapor destruction unit must:
 - 1. Have a detonation arrester located between the first liquid knockout vessel, or the facility vapor connection if no liquid knockout vessel is required, and the multiple facility vapor collection system connection; and
 - 2. Have an inerting, enriching, or diluting system that meets the requirements of 154.924 of this subpart.
- e) Except for a discharge vent from a vapor destruction unit, each outlet of a vapor control system that vents to atmosphere and is not isolated with a pressure-vacuum relief valve must have a flame arrester located at the outlet.

154.922 Detonation arresters, flame arresters, and flame screens

- a) Each detonation arrester required by this part must:
 - 1. Be capable of arresting a detonation from either side of the device; and
 - 2. Be acceptable to the Commandant (G-MTH). A detonation arrester designed, built, and tested in accordance with appendix A of 33 CFR 154.800 will be acceptable to the Commandant (G-MTH).
 - 3. Be located within 50 meters of the non-specific locations designated in this Part.
- b) Each flame arrester required by this part must be acceptable to the Commandant (G-MTH). A flame arrester designed, built, and tested by Underwriter's Laboratories, Inc. (UL), Factory Mutual (FM) or meeting the requirements of ASTM F-1273 will be acceptable to the Commandant (G-MTH).
- c) Each flame screen required by this part must be either a single screen of corrosion resistant wire of at least 30 by 30 mesh, or two screens, both of corrosion resistant wire, of at least 20 by 20 mesh, spaced not less than 25 millimeters (1/2 in.) or more than 75 millimeters (1 1/2 in.) apart.

154.924 Inerting, enriching, and diluting systems

- a) A vapor control system which uses an inerting, enriching, or diluting system must be equipped with a gas injection and mixing arrangement ~~that must be completed within 100 meters of the injection point;~~

- b) A vapor control system that uses analyzers to control the amount of inerting, enriching, or diluting gas injected into the vapor collection line must be ~~equipped with at least one analyzer~~. The analyzers must be connected so that:
1. When dual oxygen analyzers are used, the higher oxygen concentration reading controls the inerting or enriching system and activates the alarm and automatic shutdown system required by paragraph (f), (h), or (i)(2) of this section, or when voting systems utilizing more than two analyzers are used, the majority pair controls the inerting or enriching system and activates the alarm and automatic shutdown system required by paragraph (f), (h), or (i)(2) of this section;
 2. When two hydrocarbon analyzers are used, the lower hydrocarbon concentration reading controls the enriching system and activates the alarm and automatic shutdown system required by paragraph (g) of this section, or when voting systems utilizing more than two analyzers are used, the majority pair controls the inerting or enriching systems and activates the alarm and automatic shutdown system required by paragraph (g); and
 3. When two hydrocarbon analyzers are used, the higher hydrocarbon concentration reading controls the diluting system and activates the alarm and automatic shutdown system required by paragraph (j) of this section, or when voting systems utilizing more than two analyzers are used, the majority pair controls the diluting system and activates the alarm and automatic shutdown system required by paragraph (j) of this section.
- c) A vapor control system that uses volumetric measurements to control the amount of inerting, enriching, or diluting gas injected into the vapor collection line must be equipped with at least one analyzer to activate the alarms and automatic shutdown systems required by this section.
- d) Each oxygen or hydrocarbon analyzer required by this section must:
1. Be installed in accordance with API Recommended Practice 550;
 2. Have a response time of not more than 30 seconds from the time the vapor is sampled; and
 3. Sample the vapor concentration continuously not more than 30 pipe diameters from the gas injection point.
- e) Oxygen analyzers which operate at elevated temperatures (i.e. zirconia oxide or thermomagnetic) must not be used.
- f) An inerting system must:
1. Supply sufficient inert gas to the vapor stream to ensure that the oxygen concentration down stream of the injection point is maintained below 60 percent of the minimum oxygen concentration by volume necessary for combustion for the specific combination of cargo vapors and inerting gas being processed;

2. Activate an alarm when the oxygen concentration in the vapor collection line exceeds 60 percent of the minimum oxygen concentration by volume necessary for combustion for the specific combination of cargo vapors and inerting gas being processed;
 3. Close the remotely operated cargo vapor shutoff valve required by 154.910(a) of this part and shutdown any vapor mover when the oxygen concentration in the vapor collection line exceeds 70% of the minimum oxygen concentration by volume necessary for combustion for the specific combination of cargo vapors and inerting gas;
 4. The alarm value in (f)(2) must be at least 1 percent less than the shutdown value in (f)(3). If the oxygen analyzer used to measure oxygen concentrations cannot accurately differentiate between the alarm value and the shutdown value, the alarm value must be lowered until the analyzer becomes operable.
 5. If a combustion device is used to produce the inert gas, have a detonation arrester and non-return valve between the combustion device and the inert gas injection point.
- g) An enriching system must:
1. Supply sufficient compatible hydrocarbon vapor to the vapor stream to ensure that the hydrocarbon concentration after the injection point is maintained above 170 percent by volume of the upper flammable limit;
 2. Activate an alarm when the hydrocarbon concentration in the vapor collection line falls below 170 percent by volume of the upper flammable limit;
 3. Close the remotely operated cargo vapor shutoff valve and shutdown required by 154.910(a) of this subpart, and shutdown any vapor mover when the hydrocarbon concentration in the vapor collection line falls below 150 percent by volume of the upper flammable limit; and
 4. For those cargoes with an upper flammable limit too high to operate under the 170 percent and 150 percent by volume constraints in this section, the hydrocarbon detector must activate an alarm at no less than the UFL + 10 percent and shutdown at no less than the UFL + 7.5%. The UFL is either the cargo's UFL or the enriching gas UFL, whichever is higher.
- h) Oxygen analyzers may be used in lieu of hydrocarbon analyzers in an enriching system at a facility that receives cargo vapor only from a vessel with non-inerted cargo tanks, provided that the analyzers:
1. Activate an alarm when the oxygen concentration in the vapor collection line exceeds a level corresponding to a hydrocarbon concentration of 170 percent of the upper flammable limit; and
 2. Close the remotely operated cargo vapor shutoff valve required by 154.810(a) of this subpart and shutdown any vapor mover when the oxygen concentration in the vapor collection line exceeds a level corresponding to a hydrocarbon concentration of 150% of the upper flammable limit;

3. For those cargoes with an upper flammable limit too high to operate under the 170 percent and 150 percent by volume constraints, the oxygen analyzers must activate an alarm and shutdown when the oxygen concentration exceeds a level corresponding the UFL + 10 percent and UFL + 7.5 percent, respectively. For this purpose the UFL is either the cargo UFL or the enriching gas UFL, whichever is higher; and
 4. The alarm value in (h)(1) must be at least 1 percent less than the shutdown value in (h)(2). If the oxygen analyzer used to measure oxygen concentrations cannot accurately differentiate between the alarm value and the shutdown value, the alarm value must be lowered until the analyzer becomes operable.
- i) An enriching system may be used in a vapor collection system that degasses vapor from a vessel with inerted cargo tanks if:
1. Hydrocarbon analyzers are used to comply with paragraph (g)(2), (g)(3), and (g)(4) of this section; or
 2. If oxygen analyzers are used, the analyzers activate an alarm when the oxygen concentration in the vapor collection line exceeds 60 percent by volume of the minimum oxygen concentration for the specific combination of cargo vapors and inerting gas, and close the remotely operated cargo vapor shutoff valve required by 154.910(a) of this subpart and shutdown any vapor mover when the oxygen concentration exceeds 70 percent by volume of the minimum oxygen concentration necessary for combustion for the specific combination of cargo vapors and inerting gas.
- j) An air dilution system must:
1. Supply sufficient additional air to the vapor stream to ensure that the hydrocarbon concentration throughout the vapor collection line ~~does not exceed 30 percent by volume of the lower flammable limit~~
 2. Activate an alarm when the hydrocarbon concentration in the vapor collection line exceeds 30 percent by volume of the lower flammable limit; and
 3. Close the remotely operated cargo vapor shutoff valve required by 154.910(a) of this subpart and shutdown any vapor mover when the hydrocarbon concentration in the vapor collection line exceeds 50 percent by volume of the lower flammable limit.

154.926 Vapor compressors and blowers

- a) Each inlet and outlet to a compressor, blower or other vapor moving device which handles vapor other than high flash point cargo that has not been inerted, enriched, or diluted prior to the blower inlet in accordance with 154.924 of this subpart must be fitted with a detonation arrester.
- b) If a reciprocating or screw-type compressor handles vapor in the vapor collection system, it must be provided with indicators and audible and visible alarms to warn against the following conditions:
 - 1. Excessive discharge gas temperature at each compressor chamber or cylinder;
 - 2. Excessive cooling water temperature;
 - 3. Excessive vibration;
 - 4. Low lube oil level;
 - 5. Low lube oil pressure; and
 - 6. Excessive shaft bearing temperatures.
- c) If a liquid ring-type compressor handles vapor in the vapor collection system, it must be provided with indicators and audible and visible alarms to warn against the following conditions:
 - 1. Low level of liquid sealing medium;
 - 2. Lack of flow of liquid sealing medium; and
 - 3. Excessive temperature of the liquid sealing medium.
- d) If a centrifugal compressor, fan, or lobe blower handles vapor other than high flash point cargoes in the vapor collection system, construction of the blades and/or housing must meet one of the following:
 - 1. Blades or housing of nonmetallic construction;
 - 2. Blades and housing of nonferrous material;
 - 3. Blades and housing of corrosion resistant steel;
 - 4. Ferrous blades and housing with one-half inch or more design tip clearance; or
 - 5. Blades of aluminum or magnesium alloy and a ferrous housing with a nonferrous insert sleeve at the periphery of the impeller.
- e) Before initial use of a blower, compressor or other vapor moving device in a degassing operation, the maximum capacity of the device must be determined for the installed piping configuration. This shall be done by installing a temporary flow measuring device at the point where the vapor collection hose would attach to the vapor collection system. For the test, no hose or barge should be connected to the system. The vapor moving device should then be allowed to run at its maximum capacity, and the actual flow of air into the system determined.

154.928 Vapor recovery and vapor destruction units

- a) The inlet to a vapor recovery unit which receives vapor other than from high flash point cargo that has not been inerted, enriched, or diluted in accordance with 154.924 of this subpart must be fitted with a detonation arrester.
- b) The inlet to a vapor destruction unit that processes vapors other than high flash point cargo ~~must have quick-closing stop valves~~ installed in the vapor line. At least one of these valves must be located immediately upstream of the detonation arrester required by 154.928(c)(2).
- c) A vapor destruction unit processing vapors other than high flash point cargoes must:
 - 1. ~~Not be within 30 meters (98.8 ft)~~ of any tank vessel berth or mooring at the facility;
 - 2. Have a detonation arrester fitted in the vapor line;
 - 3. Alarm and shutdown when a flame is detected on the detonation arrester; and
 - 4. Have an inerting, enriching or diluting system meeting the requirement of paragraph 154.924 installed in the vapor collection header so that any vapors entering the combustion device have been rendered non-combustible in the piping system.
- d) A vapor destruction unit processing vapors of only high flash point vapors must:
 - 1. Not be within 30 meters (98.8 ft) of any tank vessel berth or mooring at the facility;
 - 2. Have a detonation arrester fitted in the vapor line; and
 - 3. Alarm and shutdown when a flame is detected on the detonation arrester.
- e) When a vapor destruction unit shuts down or has a flame-out condition the vapor destruction unit control system must:
 - 1. Close the quick-closing stop valves required by paragraph (b)(2) of this section;
 - 2. Close the remotely operated cargo vapor shutoff valve required by 154.910(a) of this subpart;
 - 3. Fluid displacement systems must automatically stop the flow of any fluid into the vessel being degassed; and
 - 4. Automatically stop any compressors, blowers or other vapor moving devices installed in the system.

154.940 Personnel training

- a) A person in charge of a cleaning operation utilizing a vapor control system must have completed a training program covering the particular system installed at the facility and on the vessel. Training must include drills or demonstrations using the installed vapor control system covering normal operations and emergency procedures.
- b) The training program required by paragraph (a) of this section must cover the following subjects:
 - 1. Purpose of a stripping, degassing and vapor control system;
 - 2. Principles of the stripping, degassing and vapor control system;
 - 3. Components of the stripping, degassing and vapor control system;
 - 4. Hazards associated with the stripping, degassing and vapor control system;
 - 5. Special hazards associated with the accumulation and discharge of static electricity;
 - 6. Coast Guard regulations in this subpart;
 - 7. Operating procedures, including:
 - I. Testing and inspection requirements,
 - II. Pre-cleaning procedures,
 - III. Chemicals approved for collection,
 - IV. Material safety data sheet review,
 - V. Connection sequence,
 - VI. Start-up procedures,
 - VII. Safeguards to prevent static discharge;
 - VIII. Normal operations; and
 - IX. Emergency procedures.

154.950 Operational requirements

- a. ~~A facility must not be supplied only from a vessel which is not a~~
~~CFR 154.924(b)~~
- b. The following test and checks must be performed ~~not more than 24 hours prior to~~
cleaning operation:
 - 1) Pressure alarms and automatic shutdown systems required by this part must be tested. Each test must include a realistic application of pressure and vacuum as necessary to provide an operating test;
 - 2) The analyzers required by 154.920(a), 154.924(d) and (e) of this subpart must be checked for calibration by use of a span gas; and
 - 3) The vacuum relief valve required by 154.914(e) and the pressure relief valve required by 154.914(k) must be checked to make sure they are operating freely and flame screens or flame arresters are not damaged.
- c. The position of all valves in the vapor line between the vessel's tanks and the facility vapor collection system must be verified prior to the start of the transfer operation.
- d. The degassing rate must not exceed the maximum allowable degassing rate as determined by the lesser of the following:
 - 1) A degassing rate corresponding to the maximum vapor processing rate for the cleaning facility vapor control system, as specified in the facility operations manual; or
 - 2) The vessel's maximum degassing rate determined in accordance with 46 CFR 39.53-2(d).
- e. Mixing of incompatible vapors is prohibited. The vapor collection system piping, equipment, hoses, valves and arresters must be purged between degassing operations that involve incompatible chemical vapors. The purge must be inert gas, air or enriching gas, and be adequate to reduce the level of residual vapor to a level where reaction with the subsequent vapor cannot occur. The required duration of purge time must be determined by calculation and approved by the certifying entity during the initial review. Chemical compatibility must be determined by using the procedures outlined in 46 CFR 150 Subpart A - Compatibility of Cargoes.
- f. As long as at least one of the analyzers required by 154.924(b) of this subpart remains inoperable during a degassing operation, the operation may continue provided the remaining analyzer remains operational; however, no further degassing operations may be started until any inoperable analyzer(s) are replaced or repaired.
- g. Whenever a condition results in a shutdown of the vapor control system, the person in charge shall immediately terminate cleaning operations.

- b. If it is suspected that a flare in the vapor control system has had a flareback, or if a flame is detected on the detonation arrester required by 154.928(c)(2) of this subpart, the cleaning operation must be stopped and not be restarted until the detonation arrester has been inspected and found to be in satisfactory condition.

- i. For air displacement systems the following items must be confirmed;
- 1) The ~~minimum~~ amount of open area for air flow has been determined so the cargo compartment pressure ~~cannot~~ ~~exceed~~ ~~the~~ ~~maximum~~ ~~allowable~~ ~~pressure~~ at the maximum flowing condition of the vapor mover;
 - 2) The minimum open area has been securely opened so that accidental closure is not possible. The hatch must be opened before the pressure in the vessel reaches a pressure lower than 10 percent of the lowest setting of any of the vessel vacuum relief valves.
- j. All alarms, shutdowns and other operating systems should be tested at least once a year per the requirements of 33 CFR 156.170(g). This test should be witnessed by a representative of the U.S. Coast Guard. To facilitate the yearly test, a test procedure must be place in the dock operations manual. The test procedure must be approved by the certifying entity during the initial acceptance of the system, and after any revisions resulting from system modifications.
- k. Prior to cleaning operations, the freezing point of the cargo must be determined and adequate precautions taken to prevent freezing if there is the possibility the ambient temperature during degassing will be at or below the freezing point of the cargo.
- l. Prior to cleaning operations, the cargo potential for polymerization must be determined and adequate precautions taken to prevent and detect polymerization of the cargo vapors.
- m. Prior to stripping operations, the maximum allowable stripping rate must be determined. The maximum allowable stripping rate can not exceed the volumetric capacity of the vessel's vacuum relief valve(s) at the valve's set point for the cargo tank(s) being stripped when this stripping operation occurs without any hatches or other fittings being open on the cargo tank being stripped.
- n. When required by 154.914(g), the pressure sensing devices must be installed, prior to commencing any cleaning operations and being tested in accordance with the requirements of 154.950(b).

154.960 Requirements for Special Chemicals

- a) Vapor collection systems that collect vapors with the potential to polymerize must meet the following requirements;
 - 1) The vapor control system must be designed to prevent condensation of monomer vapor. Methods such as heat tracing and insulation are permitted if they will not result in an increased risk of polymerization.
 - 2) The facility vapor collection system must be designed so that polymerization can be detected. Any points suspected of being sites for potential polymerization buildup should be equipped with inspection openings meeting the requirements of paragraph 154.908(b).
 - 3) The facility vapor collection system must be designed to prevent a drop across the system due to polymerization. Devices, including differential pressure monitors, must be incapable of transmitting a detonation across an arrester.
- b) Vapor collection systems that collect vapors with the potential to freeze at normal ambient conditions must meet the following requirements;
 - 1) The vapor control system must be designed to prevent condensation of the low freezing point chemical, or to remove the condensation before it can accumulate.

PART 156 - AMENDED

add a new 156.120 (t)(4)

t) (1) - (3) no change

4. After unloading operations are completed, ensure each cargo hose, loading arm or any piping system containing cargo or cargo residues is closed off and that no cargo is permitted to be drained back to the tank barge.

156.120 Requirements for transfer or cleaning

- ab) A cleaning operation which includes collection of vapor emitted from a vessel's cargo tanks through a venting system not located on the vessel must have the following verified by the person in charge:**
1. Each manual valve in the vapor collection system is correctly positioned to allow the collection of degassing vapor;
 2. A vapor collection hose or arm is connected to the vessel's fixed piping system for degassing;
 3. The electrical insulating device or a one (1) meter length of non-conductive hose required by 154.910(f) of this chapter is fitted between the facility vapor connection and the vessel's fixed piping system for degassing;
 4. The maximum allowable degassing rate is determined;
 5. The maximum allowable stripping rate is determined;
 6. The maximum and minimum operating pressures of the vessel being cleaned are determined;
 7. The following have been performed not more than 24 hours prior to the start of the degassing operation:
 - I. Each alarm and automatic shutdown system test required by 33 CFR 154.950(b)(1) of this chapter has been tested and found to be operating properly, and
 - II. Analyzers required by 154.920(a), 154.924(d) and (e) of this chapter have been checked for calibration by use of a span gas;
 8. Each vapor recovery hose has no unrepaired loose covers, kinks, bulges, soft spots, or any other defect which would permit the discharge of vapor through the hose material, and no external gouges, cuts, or slashes that penetrate the first layer of hose reinforcement; and
 9. If required, the pressure sensing devices required by 154.914 (g) are installed and tested per the requirements of 154.950 (b).

156.170 Equipment tests and inspections

- h) If a cleaning facility collects vapor emitted from a vessel cargo tank with a vapor control system, the system must not be used unless the following tests and inspections are satisfactorily completed:
1. Each vapor hose, vapor collection arm, pressure or vacuum relief valve, and pressure sensor is tested and inspected in accordance with paragraphs (b),(c) and (f) of this section;
 2. Each remote operating or indicating device is tested for proper operation in accordance with paragraph (f) of this section;
 3. Each detonation arrester required by 154.920, 154.924(h)(5), 154.926(a), and 154.928(a) of this chapter has been inspected internally within the last year, or sooner if operational experience has shown that frequent clogging or rapid deterioration is likely; and
 4. Each hydrocarbon and oxygen analyzer required by 154.920(a) and 154.924(b) and (c) of this chapter or is calibrated within 24 hours prior to operation when the vapor control system is operated less frequently than once a week.

H. 39.51-4 Submission of Vessel Stripping and Degassing Systems Designs- TB/ALL

- (a) PV valve vacuum flow capacity,
- (b) Stripping lines,
- (c) Pressure sensor and PI connection,
- (d) Table I, Vessel Hatch / Open Area vs. Flow

I. Subpart 39.52 - Design and Equipment

J. 39.52-1 Vessel Stripping and Degassing Systems TB/ALL

- a) Each vessel engaged in stripping or degassing operations at an approved facility must have a conductive fixed stripping line in each cargo tank. The line must extend to the low point of each cargo tank, extend through and be welded to the top of the cargo tank, and terminate above deck with a full port valve plugged at the open end ;
- b) Existing vessel fixed stripping systems may be used in lieu of 52-1(a) provided they are effective in removing the heel remaining in the cargo tanks;
- c) Each stripping line must be labeled as "Stripping Line-Tank # XXX";
- d) A vessel may have vapor connections located in the vicinity of each tank in order to preserve segregation of cargo systems, in lieu of common header piping;
- e) Vapors may be collected from the vessels cargo tanks through a common vapor header, or through flanged, valved connections at the top of each cargo tank, or through the liquid cargo header;
- f) The vapor collection system must not interfere with the proper operation of the cargo tank venting system;
- g) Other gaseous mediums, such as inert gas, may be injected into the vessel's tanks through any of the valved connections stated in .52-1(e) above;

- h) Liquid media must be injected into the vessel's tanks through the liquid cargo piping header only;
- i) Vessels utilizing liquid displacement media must be equipped with and comply with the overfill protection requirements of part 39 of this chapter;
- j) In order to minimize static discharge, all equipment used on the barge during stripping or degassing operations must be electrically bonded to the vessel and tested to insure continuity before each use;
- k) Vapor collection piping must be electrically bonded to the hull and must be electrically continuous;
- l) Each hose used for transferring vapors only during stripping or degassing operations must:
 - 1) Have a design burst pressure of at least 25 psig;
 - 2) Have a maximum allowable working pressure of at least 5 psig;
 - 3) Be capable of withstanding at least the maximum vacuum rating of the vapor moving device of the cleaning facility without collapsing or constricting;
 - 4) Be electrically continuous with a maximum resistance of ten thousand (10,000) ohms;
 - 5) Have flanges with a bolt hole arrangement complying with the requirements for 150 pound class ANSI B16.5 flanges, and be abrasion resistant and resistant to kinking, and
 - 6) Vapor/liquid hose handling equipment must be provided with hose saddles which provide adequate support to prevent kinking or collapse of hoses.
- m) Each hose used for transferring liquids during stripping or degassing operations must:
 - 1) Have a design burst pressure of at least 600 psig;
 - 2) Have a maximum allowable working pressure of at least 150 psig;
 - 3) Be capable of withstanding at least the maximum vacuum rating of the vapor moving device of the cleaning facility without collapsing or constricting;
 - 4) Be electrically continuous with a maximum resistance of ten thousand (10,000) ohms;
 - 5) Have flanges with a bolt hole arrangement complying with the requirements for 150 pound class ANSI B16.5 flanges, and be abrasion resistant and resistant to kinking, and

6) Vapor/liquid hose handling equipment must be provided with hose saddles which provide adequate support to prevent kinking or collapse of hoses.

n) The facility vapor connection must be electrically insulated from the vessel vapor connection in accordance with section 6.10 of the OCIMF International Safety Guide for Oil Tankers and Terminals.

K. 39.52- 2 Underpressure Protection During Stripping and Degassing Operations - TB/ALL

- a) The cargo tank venting system required by 46 CFR 32.55 of this chapter must:
- (1) Not exceed the maximum design working pressure for the tank;
 - (2) Must not exceed the maximum design vacuum for the tank;
- b) Each vessel must be fitted with a means for connecting the pressure sensors and pressure indicating devices required by 33 CFR 154.914 (g) (1) & (2) and 33 CFR 154.914(m) on each cargo tank top. The valved connection point must be labeled "Pressure Sensor Connection".
- c) For stripping operations with closed cargo tanks, the maximum facility stripping rate must not exceed the volumetric flow capacity of the vacuum relief valve protecting the cargo tank to be stripped.

L. Subpart 39.53 - Operations

M. 39.53-1- Inspection Prior To Conducting Degassing Operations - TB/ALL

- a) The following inspections must be conducted prior to commencing degassing operations:
- 1) Each part of the vessels vapor collection system is aligned to allow vapor to flow to a cleaning facility vapor control system;

- 2) Vapor collection hoses or arms are connected to the vessels vapor connection;
- 3) If a fluid displacement system is used for degassing operations:
 - (i) the fluid supply line is connected to the fluid injection connection, and
 - (ii) the maximum fluid injection rate is determined in accordance with 39.53-2(c)(2) of this subchapter;
- 4) The maximum stripping or degassing rate is determined in accordance with 39.52-2(b) and 39.53-2 (c)(1) of this subchapter; and adequate openings required by 39.53-2(e) are available and identified.
- 5) The pressure sensors and pressure indicators required by 33 CFR 154.914 (g) (1) and (2) are connected as required by 39.52-2(b).
- 6) The maximum and minimum operating pressures of the vessel being cleaned are determined;
- 7) Each vapor recovery hose has no unrepaired loose covers, kinks, bulges, soft spots, or any other defect which would permit the discharge of vapors through the hose material, and no gouges, cuts, or slashes that penetrate the first layer of hose reinforcement; and
- 8) The facility vapor connection must be electrically insulated from the vessel vapor connection in accordance with section 6.10 of the OCIMF International Safety Guide for Oil Tankers and Terminals.
- 9) All equipment is bonded in accordance with 39.52-1(g) of this sub-chapter.

N. 39.53-2- Operational Requirements - TB/ALL

- a) Vapors from a tank vessel may not be transferred during stripping or degassing operations to a cleaning facility in the United States which does not have its letter of adequacy endorsed as meeting the requirements of 33 CFR part 154, subpart E, Vapor Control Systems;
- b) Prior to commencement of stripping operations, the maximum allowable stripping rate must be determined. The maximum allowable stripping rate must not exceed the volumetric flow capacity of the vacuum relief valve protecting the cargo tank being stripped;
- c) The degassing rate must not exceed the maximum allowable degassing rate as determined by the following:
 - 1) For an air displacement system:
 - (i) The maximum allowable degassing rate is a function of the area open to the atmosphere of the cargo tank being degassed. The area open to atmosphere must be large enough to prevent the pressure in the cargo tank being degassed from becoming no lower than 0.2 psi vacuum (14.5 psia). The maximum allowable degassing rate can be calculated from Table One using the area open to atmosphere of the cargo tank being degassed as the entering argument.
 - 2) For fluid displacement systems, the maximum degassing rate is determined by the lesser of the following:
 - (i) The rate imposed by the capacity of the cargo tank venting system; or
 - (ii) The rate based on pressure drop calculations at which, for a given pressure at the facility vapor connection, the pressure in the cargo tank being degassed exceeds 80 percent of the setting of any pressure relief valve in the cargo tank venting system.
- d) Any hatch and/or fitting used to calculate the minimum area required to be open to atmosphere in accordance with 39.53-2 (c) (1) (i) must be opened and secured in such a manner as to prevent accidental closure during degassing. The hatch and/or fitting must be secured open prior to the pressure reaching ten percent of the set point of the vacuum relief valve protecting the cargo tank being degassed.

- e) In order to minimize static discharge, all equipment used on the barge during stripping or degassing operations must be electrically bonded to the vessel and tested to insure continuity before each use;
- f) If the vessel is equipped with an inert gas system, and the system is not being used as the source of fluid displacement medium for degassing, the isolation valve required by 39.20-1(a)(6) of this part must remain closed during the stripping or gas freeing operations;
- g) The electrical insulating device or a one (1) meter length of conductive hose required by 154.910(f) of this chapter is fitted between the facility vapor connection and the vessel's fixed piping system for degassing;
- h) If the vessel collects vapors from incompatible cargoes simultaneously, it must keep the incompatible vapors separate throughout the entire vapor collection system. Chemical compatibility must be determined by using the procedures outlined in 46 CFR 150(A)--Compatibility of Cargoes.

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33 CFR PART 156 - AMENDED

add a new 156.120 (t)(4), and 156.120 (t)(5):

t) (1) - (3) no change

- 4 .After unloading operations are completed, ensures each cargo hose, loading arm or any piping system containing cargo or cargo residues is closed off and that no cargo is permitted to be drained back to the tank barge.**
- 5. After loading or unloading operations , ensures that any remaining cargo residue is removed from the vessels' drip pans and properly disposed of at the transfer facility.**

33 CFR PART 154 - AMENDED

Add a new 154.500 (i), 154.500 (j), and change 154.540:

154.500

- (i) Each hose assembly used for transferring oil or hazardous material must have a means of being drained or closed before being disconnected after transfer operations are completed.**

154.500

- (j) Cargo hoses or load arms cannot be drained or blown back into the vessel once the discharge operation is completed.**

154.540

The facility must have a means to safely and quickly remove discharged oil or hazardous material from the containment means required by para. 154.530, and the vessel's drip pans for the transfer in progress, without discharging the oil or hazardous material into the water.